

The Role of Unconventional Gas in the Future World Energy Supply

Workshop on Golden Rules for Unconventional Gas Prospects

March 07, 2012
Warsaw, Poland

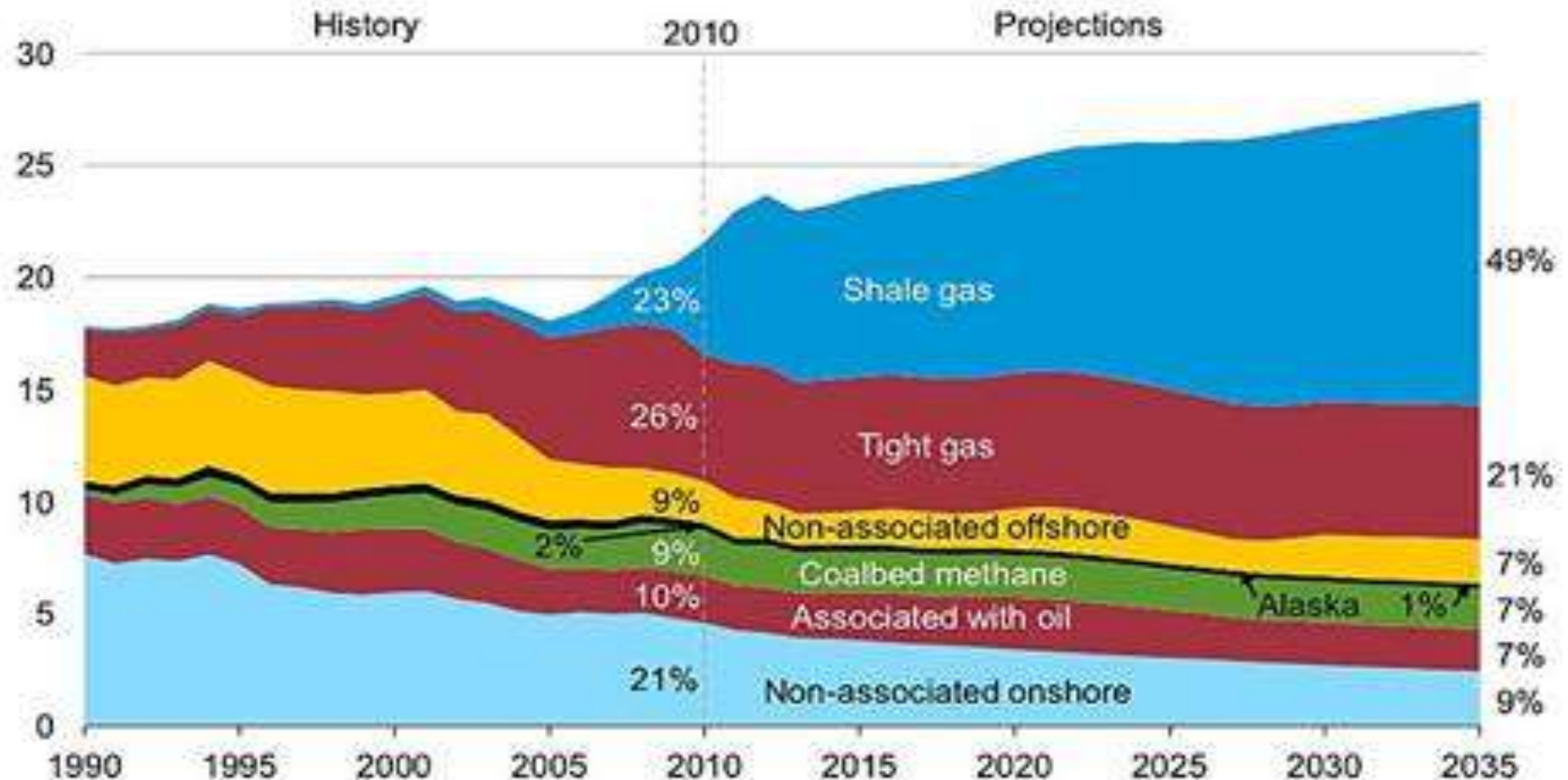
Mel Ydreos
Chair, Geopolitics & Natural Gas, IGU



THE US SHALE EXTRACTION REVOLUTION

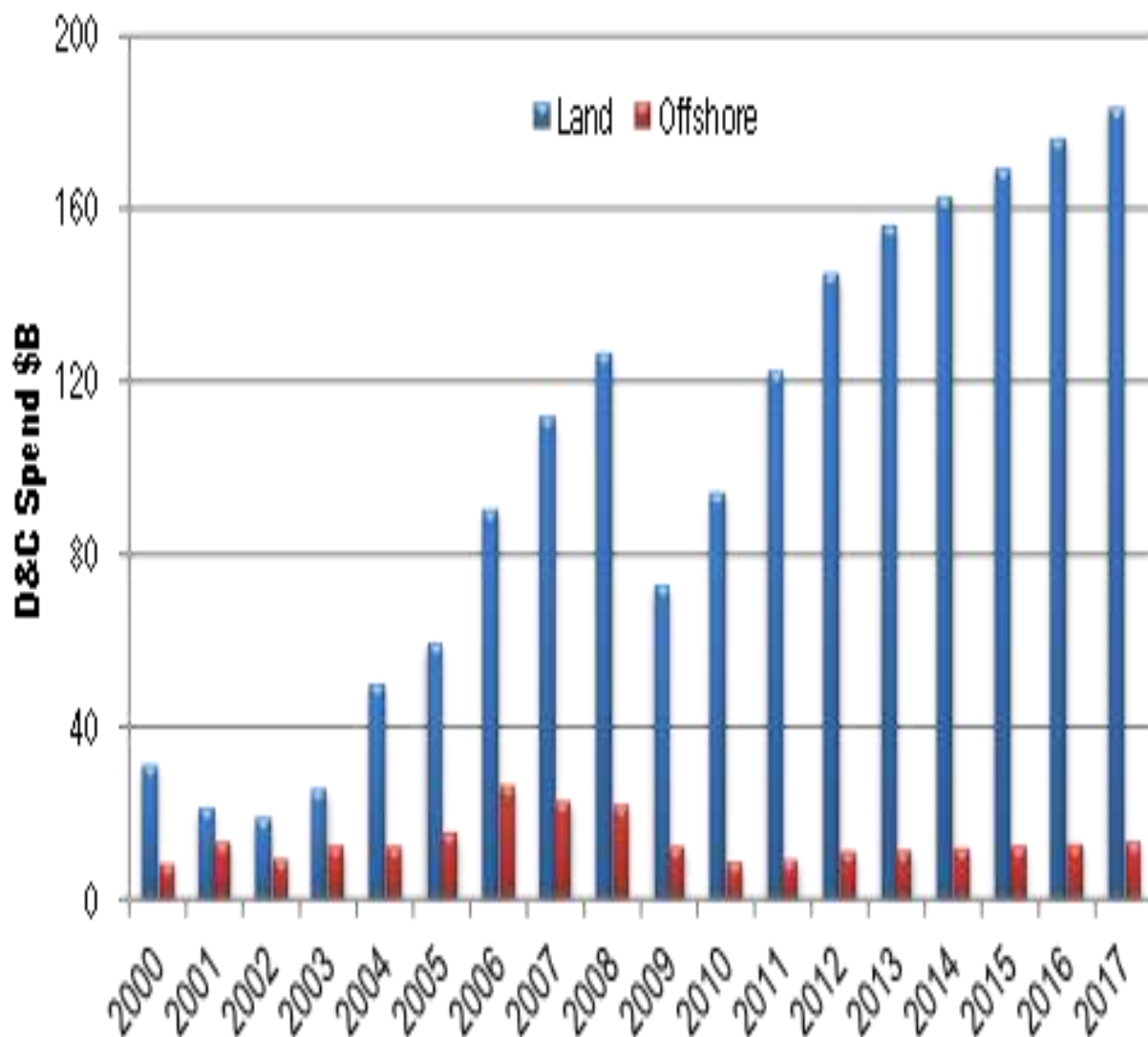


U.S. dry gas production
trillion cubic feet per year



Source: EIA, Annual Energy Outlook 2012 Early Release

US INVESTMENT IN SHALE EXTRACTION



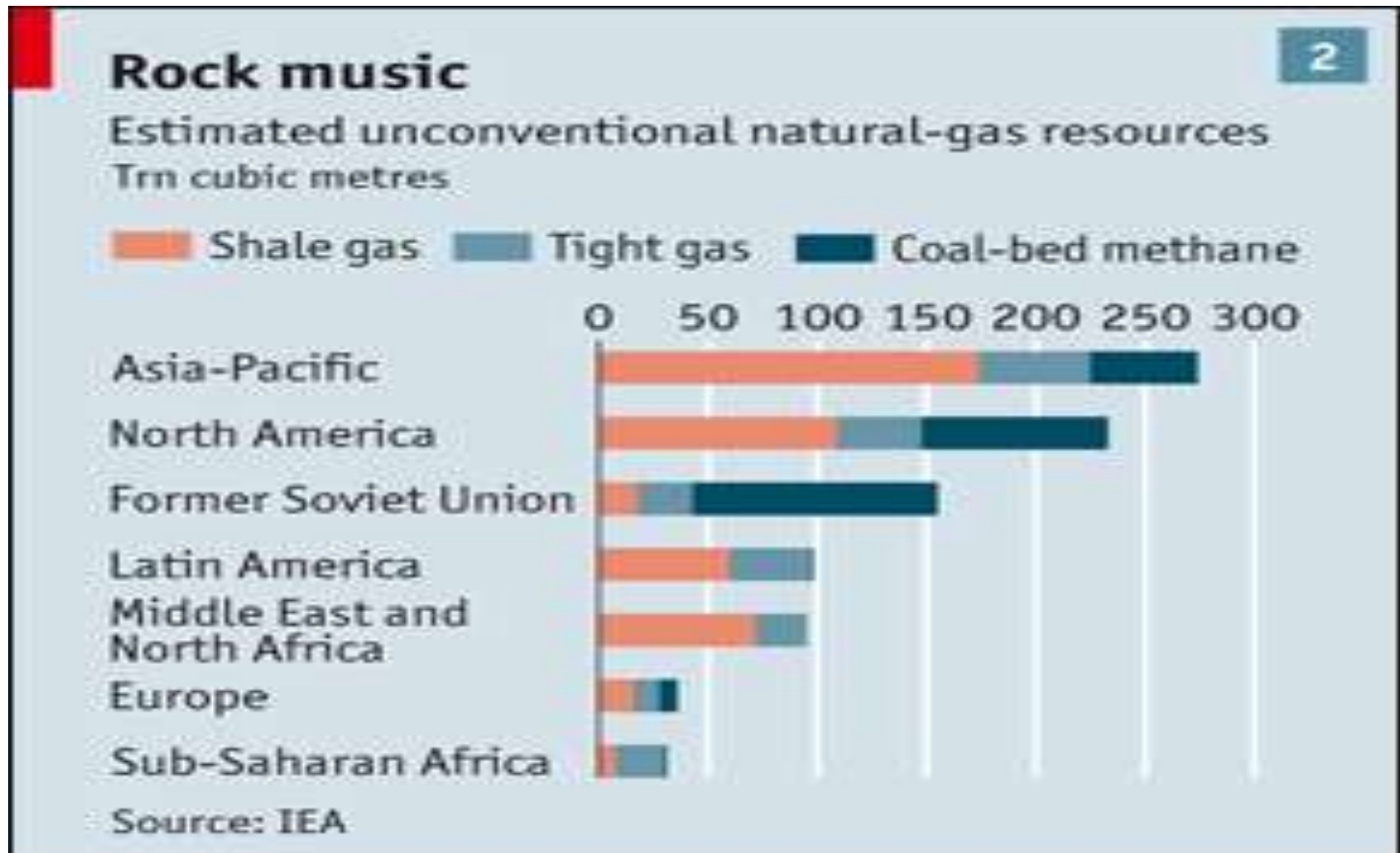
What does it really mean; intensity of activity (2011)

Rigs	1,800+
Wells	30,000+
Horizontal Wells	17,000+
Frac Stages	250,000+
Jobs	100,000+

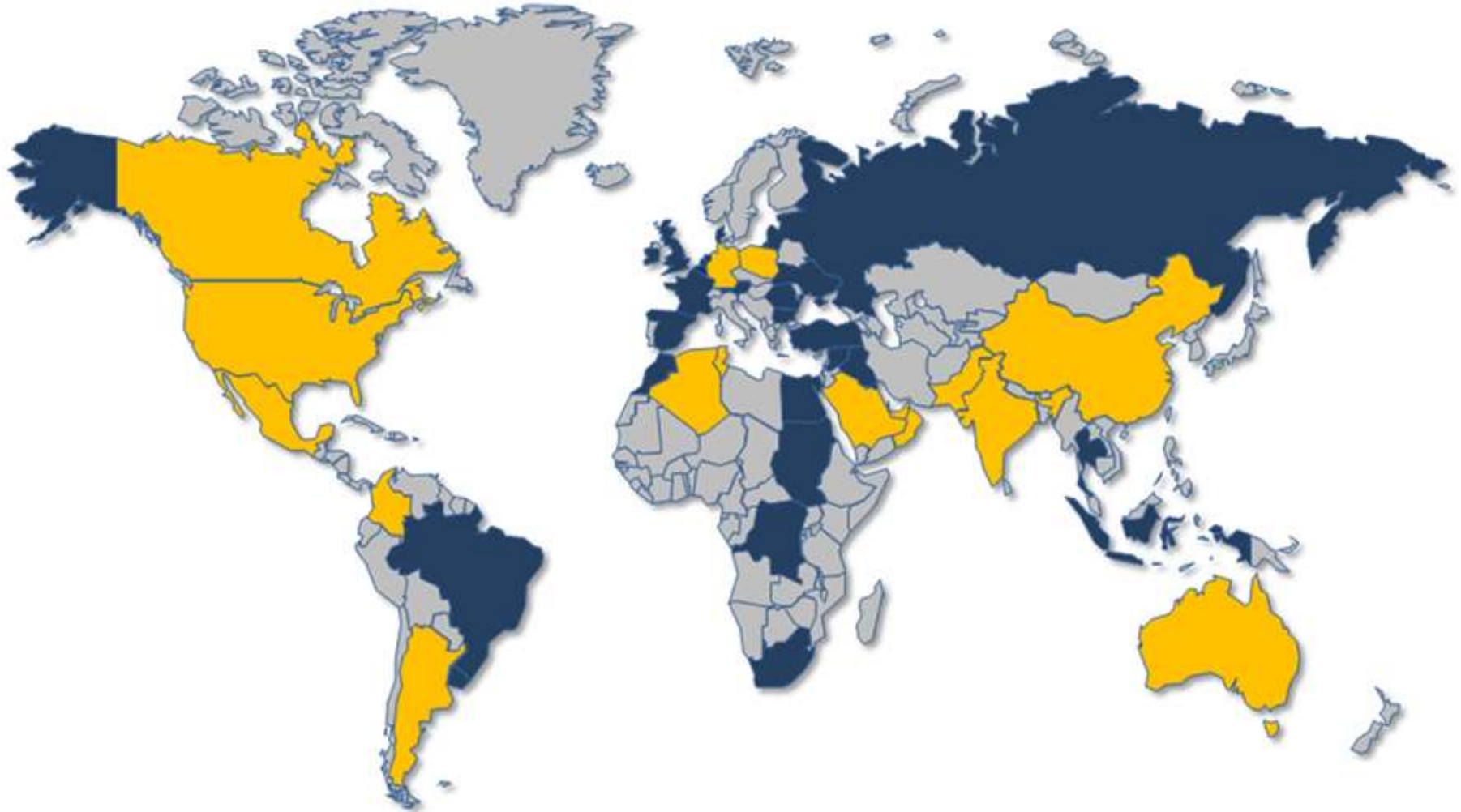
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GLOBAL UNCONVENTIONAL GAS RESOURCES



GLOBAL NATURAL GAS RESOURCES IN SHALE FORMATIONS



TECHNICALLY RECOVERABLE NATURAL GAS FROM SHALE FORMATIONS



188,000 TCM

Continent		Technically Recoverable (Tcf)
North America (non U.S.)	Canada, Mexico	1,069
	U.S.	862
Total North America		1931
Africa	Morocco, Algeria, Tunisia, Libya, Mauritania, Western Sahara, South Africa	1,042
Asia	China, India, Pakistan	1,404
Australia		396
Europe	France, Germany, Netherlands, Sweden, Norway, Denmark, U.K., Poland, Lithuania, Ukraine, Turkey	624
South America	Colombia, Venezuela, Argentina, Bolivia, Brazil, Chile, Uruguay, Paraguay	1,225
Total		6,622
Total without U.S.		5,760

MAJOR FACTORS INFLUENCING NATURAL GAS EXTRACTION FROM SHALE FORMATIONS



☐ Geological

- ☐ Formations are not homogeneous, formations differ
- ☐ Potential is difficult to estimate
- ☐ Extracting from formation “sweet spot” extremely important

☐ Economics

- ☐ Technology has driven cost investment low but productivity depletes quickly
- ☐ Prices demand focus on well productivity and operational efficiency, cash flow critical
- ☐ Price controls may impact development
- ☐ “Wet” vs. “Dry” development
- ☐ Proximity of pipeline network

MAJOR FACTORS INFLUENCING NATURAL GAS EXTRACTION FROM SHALE FORMATIONS (CON'T)



☐ **Operational and Environmental**

- ☐ Availability of services industry and resources
- ☐ Preparation and movement of equipment to the site
- ☐ Availability of water
- ☐ Flow back water handling and treatment
- ☐ Drilling intensity
- ☐ Emission mitigation

☐ **Social and Political**

- ☐ Ownership of subsurface rights
- ☐ Government commitment
- ☐ Public engagement and acceptance
- ☐ Patchwork or regulatory frameworks



THANK YOU
